

Geologic Map of the Colonial Beach South 7.5' Quadrangle, Virginia

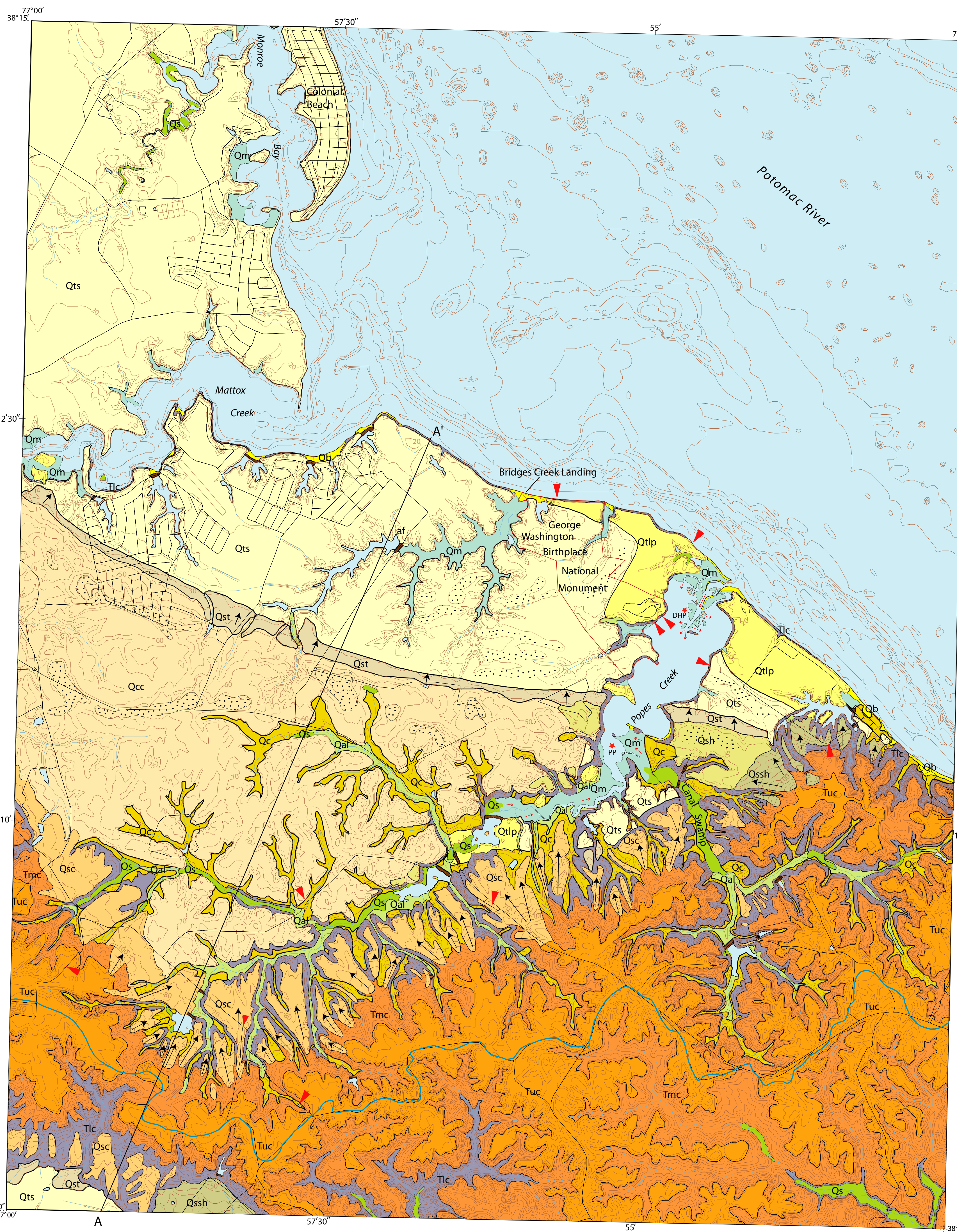
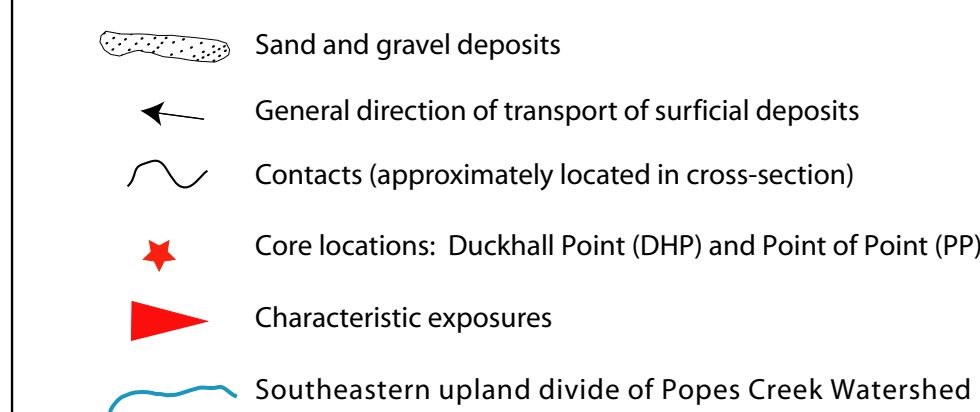
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Stratigraphic section and map units of the Chesapeake Group

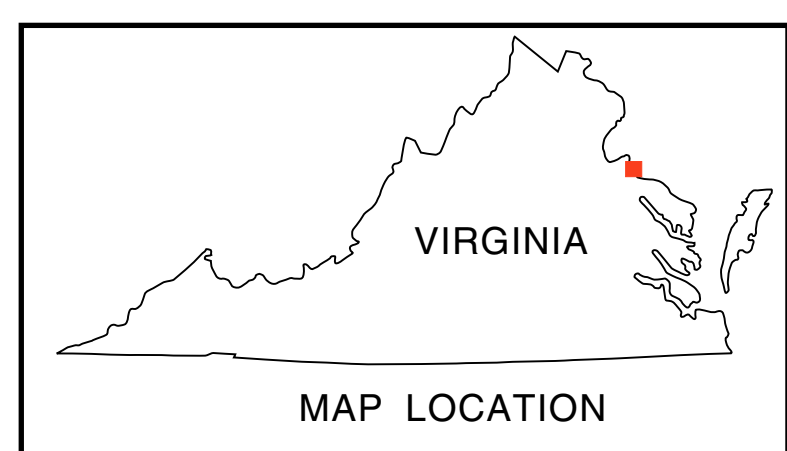
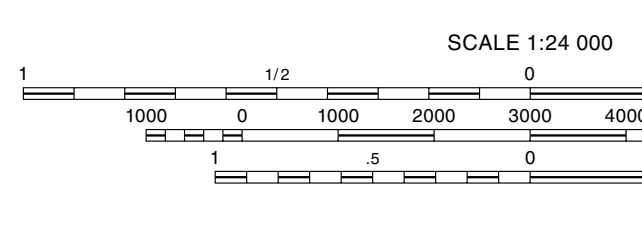
Era	Period	Epoch	Thickness in Feet (H=20)	Lithology	Map Unit	Formations and Descriptions*
			110		Upper Chesapeake Group (unconformity and gravel)	<p>Bacon's Castle Formation (site Plicone)</p> <p>Upper/lower fluid ranging intermediate to medium to coarse gravelly sand and sandy gravel, poorly sorted, thick to very thick bedded, tough cross-bedded, unit is light to medium gray, oxidizes to yellowish orange. Pebble to cobble-sized casts are mostly vein chert, quartz, and rounded casts of iron-oxide cemented sandstone derived from nearby intrusive beds in the Yorktown Formation. Overlying the granites and basal sediment of the Bacon's Castle Formation are thick bedded to massive poorly-sorted sand, silt, and clay overprinted by dark red to reddish brown. These high level terraces deposited under relict land surfaces that range in altitude from 47 to 50 m (154-174 ft). This unit is part of the upper Chesapeake Group map unit.</p> <p>Un-named unit - possibly Chocoma River/Chesapeake Formation equivalent fluvial regressive facies (site Plicone)</p> <p>Quartz and feldspar sand and sandy gravel, fine to very coarse, thin to very thick bedded, planar and trough crossbedded, poorly to well-sorted, thin amounts of clay and silt occur as matrix and as very thin to medium beds interbedded with coarser materials. Unit is commonly oxidized to yellowish-gray, yellowish-orange, and yellowish- to reddish-brown; underlying the highest topography of the Popes Creek watershed divide, the regressive Yorktown Formation facies includes a cap of fluvial sand and gravel that is tough cross-bedded and has few coarse materials. This unit truncated the underlying near-shore marine and estuarine facies of the Yorktown. Sparse boulders are concentrated at the base of the channel deposits. The upper fluvial beds are probably co-extensive with the upland gravel deposits mapped as sand and gravel (Plicone) on the adjacent Fredericksburg 30' X 60' quadrangle (Moon et al. 2000). The Plicone upland gravel was deposited as sea level. This is part of the upper Chesapeake Group map unit.</p>
			50		Middle Chesapeake Group (unconformity and gravel)	<p>Yorktown Formation (Plicone)</p> <p>Quartz and feldspar sand and sandy gravel, fine to very coarse, thin to very thick bedded, planar and trough crossbedded, poorly to well-sorted, lesser amounts of clay and silt occur as matrix and as very thin to medium beds interbedded with coarser materials. Unit is commonly oxidized to yellowish-orange, chert, and phosphate pebbles and coarse sand. The eroded contact is punctuated by burrows that penetrate the underlying Eastover Formation. The burrows are filled with the basal Yorktown sediments. In the map area, composite vertical sequences of the Yorktown Formation grade from burrowed, massively-bedded sand to interbedded, burrowed, discontinuous silt clay beds and coarse sand faser beds. Locally, smaller scale bay and estuary deposits cap the shoaling marine sequence. Commonly the Yorktown Formation is extensively weathered, and local discontinuous beds and lenses of typical Yorktown Formation facies have been completely leached leaving limonite stained "ghosts" and limonite cemented "beds" of muds and casts that include recognizable Chesapeakeoformis, other brachiopods, and gastropods. These deposits are part of the middle Chesapeake Group map unit.</p> <p>Eastover Formation (site Micocene)</p> <p>Very fine to fine quartzose sand, variably clayey and silty, thick to very thick bedded, shelly in part, inter-bedded with very fine to thick bedded, silty clay to clay, gray to grayish green, and clayey. Where the Eastover is overlain by the Yorktown, the Yorktown to bluish-gray and greenish-gray, weathers to yellowish-gray, greenish-yellow, and yellowish-brown. Molluscan bivalves dominated by the quetzalte Turritella plebea and large bivalves include isogomphus sp., Dalmanella sp., Ostrea compressa, Chesapeakea medietaria, Plesioceras plicatopelta, Mercenaria sp., and Dentalia aculeata. The small bivalve Spisula rappanhanensis, an Eastover Formation guide fossil, was dominant in environments characterized by very fine to medium sand. The map area is the subunit of the Yorktown Formation. The Yorktown Formation, uneven basal contact with the Calvert Formation is distinguished by a lag of the medium pebbles of quartz, chert, and phosphate. The marine shell fragments and shark teeth are encountered sporadically along the contact which is burrows excavated into the substrate. Thickness of the basal riverine zone ranges from 10 to 15 m. This unit and gravel (Plicone) in the map area may be as much as 15 m (50 feet). This unit is part of the middle Chesapeake Group map unit.</p>
					Lower Chesapeake Group (unconformity and gravel)	<p>St. Marys Formation</p> <p>Does not crop out in study area, locally truncated by the base of the Eastover Formation</p> <p>Choptank Formation</p> <p>Does not crop out in study area, locally truncated by the base of the Eastover Formation</p> <p>Calvert Formation (middle and early Miocene)</p> <p>Chiefly fine to very fine quartzose sand, variably silty and clayey, inter-bedded with diamictomitic silt clay and clayey silt. Thick to very thick bedded or massive; unit is medium to dark-gray, grayish-olive, and grayish-olive, grayish-yellow, grayish-brown, and grayish-olive, and pale-yellowish-gray. Locally contains several small mudstone and shale mollusks. Map unit includes several sand-silt-clay sequences ranging in thickness 2 to 12m (7-39 ft). Each sequence consists of (1) a base, very poorly sorted, very fine to coarse sand that commonly contains scattered pebbles of quartz and phosphate, fish teeth, bones, and scales, rare shell fragments, lignitized wood, and bones of marine vertebrates, grades upward to (2) clay and silt containing poorly to well-sorted diamictic forams, silicoflagellates, and amonites. (3) very thick bedded, massive, gray to grayish-brown, silty, clayey, and clayey. The unit is characterized by blocky fractures that include large-angle planar joints, and concentric sets of sheet part that mimic local topographic angles. Locally, fracture faces are stained or cemented with goethite and/or pyrite; coarse muds are commonly filled with deep root marks. Topmost cyclic sequences may be correlative with upper zones of Choptank Formation as described down bay by Newell and Rider (1982). Basal facies of coarse sand and sparse gravel is concealed below present sea level. Top of unit has been truncated and is overlain by the Fredericksburg and the Potomac. The Calvert Formation underlies the basal, low relief terraces of the Potomac. It outcrops along the eroding banks of the Potomac, near the riverine and gulches of the uplands marginal to the Potomac terraces. This is the lower Chesapeake Group map unit.</p>
						<p>Nanjemoy Formation (Eocene)</p> <p>Penetrated in subsurface below sea level by deep wells -50 to 60 ft.</p>

*Formations and descriptions congruent with more generalized units of Mixon et al, 1989, and Mixon et al, 2000

Map Explanation - lines, symbols and patterns



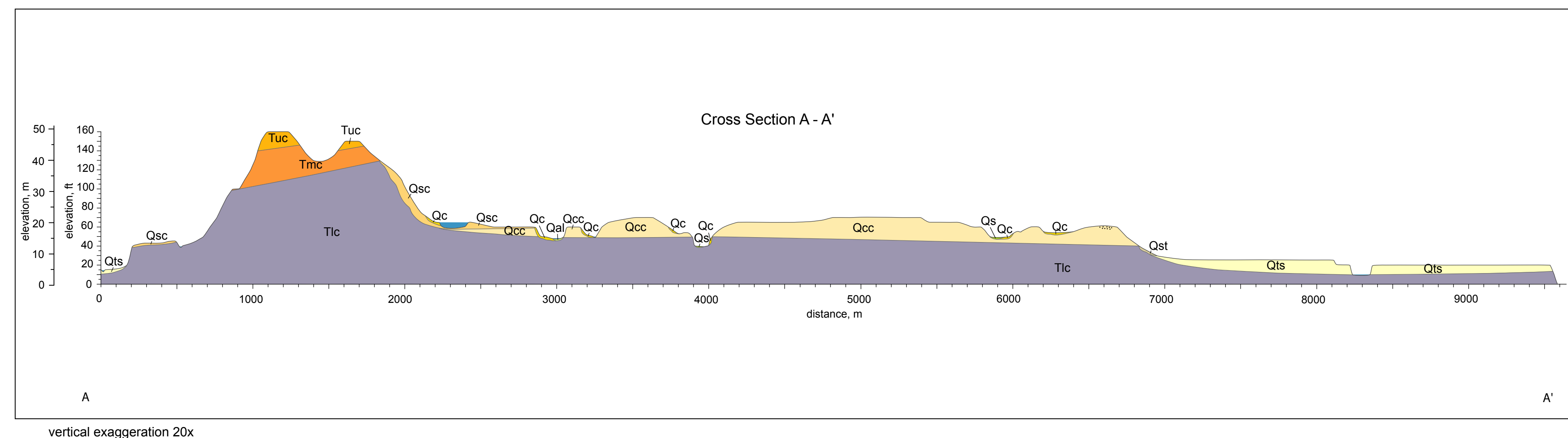
Base from USGS Digital Line Graphics (DLG) of the
Colonial Beach South, Virginia quadrangle



Correlation of Quaternary Map Units **

		Environments					
		Littoral	Estuarine	Fluvial	Colluvial	Manmade	
Holocene		<div><div><div>Qb</div><div>Beach deposits</div><div>Sand, gravel, pebbles, cobbles, boulders, well-sorted, bidirectional planar cross-beds sub-parallel to shore face and wavy/rowl fans of sand bars. Largely derived from coastal erosion of adjacent dunes underlain by the Calvert Formation with cap of Lynham Member of the Tabb Formation. Longshore transport moves beach deposits into mouth of Popes Creek. Bridges Creek Landing and the mouth of other tributaries. Wave-eroded areas of the bunts may be sediment starved, but areas of accumulation are commonly as much as 15 m wide. Thickness ranges from about 1 m to 3 m where the deposits fill old inlet channels to the Popes Creek estuary.</div></div></div>	<div><div><div>Qm</div><div>Marsh deposits</div><div>Organic litter, silt, clay and sand; poorly sorted and laminated, occurs at head of lake and inter-tidal areas along the margins of Popes Creek estuary, and in the fill of the wetlands of Bridges Creek and Dipwood Swamp. Marsh fill is historic to middle Holocene (10,000 years BP-C-14 calibrated); it ranges from 0.5 m to 5 m thick. The rate of accumulation of marsh fill is a function of the local rate of sea level rise.</div></div></div>	<div><div><div>Qal</div><div>Alluvium</div><div>Sand, pebbles, silt, clay, organic litter, cobbles, boulders; poorly to moderately well sorted in planar and trough cross-bedded channels fill deposits and crudely laminated flood plain deposits. Flood plains are characterized by repeating down stream valley sequences of unchanneled and entrenched meander channels. Cylindrical beaver ponds locally trap fine grained sediment and organic litter. Age of deposits is historic to middle Holocene (10,000-6,000 BP-C-14 calibrated)</div></div></div>	<div><div><div>Qs</div><div>Swamp deposits</div><div>Silt, fine-sand, clay organic litter; poorly sorted, crudely laminated on flood plain surfaces and in old aggraded surfaces behind beaver ponds and abandoned mill ponds. Deposits occur where groundwater discharges at surface. Age of deposits historic to middle Holocene</div></div></div>	<div><div><div>Qc</div><div>Colluvium</div><div>Sand, silt, pebbles, cobbles, boulders, poorly sorted, massive to discontinuously bedded; matrix supported clasts and discontinuous pebble horizons quasi-parallel to surface of deposit distinguish sediments from fluvial and estuarine deposits. Material is derived largely from the sandy and gravely facies of the Eastover, Yorktown, and Bacoas Castle Formations that underlie the upland topography. Trough-oriented clasts derived from former weathering/diagenetic horizons are common and aid in distinguishing the uninformative contact of slope deposits on older Miocene and Pliocene units. Several sequences of slope deposits are graded to the base level of each of the Pleistocene estuarine terraces; the older slope deposits have been weathered, eroded and redeposited in younger slope and alluvial deposits. Thickness is commonly a few meters (see figures on slope deposits).</div></div></div>	<div><div><div>M</div><div>Artificial Fill</div><div>Sand, silt, pebbles, clay, cobbles, and boulders, often chaotically intermingled. Gravel and compacted sediments excavated from upland and slope deposits.</div></div></div>
Quaternary	Late	<div><div><div>Qtp</div><div>Tabb Formation</div><div>Lynham Member (late Pleistocene)</div><div>Fine to coarse gray sand, pebbly and cobby, grading upward into clayey and silty fine sand and sandy silt; locally at base of unit, medium to coarse cross-bedded sand, gravel, cobbles, and boulders fill paleo-channel of Popes Creek proto-estuary. Unit is pale-gray to medium-gray and yellowish-gray and is commonly thin, averaging 1 meter thickness to 5 m in paleo-channel (3-15 ft). Lynham Member deposits are unconformable on the Calvert Formation and present an extreme permeability contrast with the underlying fine-grained Miocene shelf sediments.</div></div></div>	<div><div><div>Qts</div><div>Tabb Formation</div><div>Seafield Member (late Pleistocene)</div><div>Pebbly to bouldery, fine to coarse, cross-bedded sand grading upward to sandy and clayey silt; unit is pale-gray to medium-gray and yellowish-gray. The sand and gravel erosional remnant of the Seafield Member is largely preserved as a bay mouth bar deposited across the mouth of the Popes Creek proto-estuary. It is outward of the Shirley Formation bay mouth bar and is lower in altitude. Unit is commonly thin, averaging 1-5 m (3-15 ft) under bar forms. The base of the Seafield Member is characterized by open work sand and gravel resting on compact silt; fine sand of the Calvert Formation. The permeability contrast between the Seafield Member and the Calvert Formation is distinguished by a band of iron oxide cement at the base of the gravel.</div></div></div>		<div><div><div>Qst</div><div>Colluvium</div><div>Slope deposit graded to Qts; lithic description the same as Holocene colluvium</div></div></div>		
Pleistocene	Medio	<div><div><div>Qsh</div><div>Shirley Formation (middle Pleistocene)</div><div>Fine to coarse sand, in part pebbly and bouldery, light to medium-gray and pale-yellowish-gray, grades upward to silty fines and sandy silt, pale-gray to pinkish-gray. Underlies terraces of Potomac River and Popes Creek, altitudes 3-15 m (45-50 ft) in map area. The Shirley Formation is largely limited to a bay mouth bar deposit that formed across the former mouth of the Popes Creek proto-estuary. Intersected across within the bay mouth bar deposit are small planar beds and cross-beds that dip both upstream into the Popes Creek estuary and down stream toward the Potomac. Small, slightly lower terraces underlain by the Shirley Fm. are inset in the Popes Creek valley behind the bar. Remnants of the Shirley Formation deposited in the less restricted reaches of the proto-Potomac Estuary have been eroded away; the equivalent space is occupied by lower, younger terrace deposits of the Tabb Formation. Thickness is between 5 and 10 m (15-30 ft). Basal sand and gravel unconformable on a planar to channelized surface in the Calvert Formation. The permeability contrast between the openwork surficial deposit and the compact marine silty fine sand is commonly enhanced by an iron oxide cemented horizon.</div></div></div>			<div><div><div>Qsh</div><div>Colluvium</div><div>Slope deposit graded to Qsh; lithic description the same as Holocene colluvium</div></div></div>		
Early		<div><div><div>Qcc</div><div>Charles City Formation (lower to early middle Pleistocene)</div><div>Upward-fing sequence consists of a basal gravelly sand grading upward to moderately well sorted, medium to fine sand, silt, and clay; unit is light to medium gray, oxidizes to dark-yellowish-orange and yellowish-brown. Estuarine deposits underlie terraces at altitudes of 21 to 24 m (70 ft to 80 ft). Unit is extensively preserved as a high level relic bay of the Potomac River estuary. Marine tidal sequence of rhythmically bedded sand and silt couples includes abundant shell invertebrate burrows. A ridge of sand and gravel at the outer edge of the terrace was deposited as a spit that prograded across the mouth of the bay. Thickness is as much as 10 m (30 ft). Basal gravel is unconformable on the Calvert Formation.</div></div></div>			<div><div><div>Qoc</div><div>Colluvium</div><div>Slope deposit graded to Qcc; lithic description the same as Holocene colluvium</div></div></div>		

**formations and map unit descriptions are congruent with more generalized units of Mixon et al., 1989, Mixon et al., 2000



References Cited:

- Newell, Wayne L., and Rader, Eugene K. 1982. Tectonic Control of Cyclic Sedimentation in the Chesapeake Group and Maryland, AGI, Central Appalachian Geology, NE-SE GSAO Field Trip Guidebook, P.T. Lytle, Ed., p. 1-28
- Mixon, R.M., Paulides, L., Powers, D.S., Fraenkel, A.J., Weems, R.E., Schindler, J.S., Newell, W.L., Edwards, L.E., and Ward, L.W. 2000. Geology of the Chesapeake Group, 30°N Quadrangle, Virginia and Maryland, U.S. Geological Survey, Geological Investigations Series, Map 1-2607, 2 sheets
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